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KANSAS DEPARTMENT OF HEALTH & ENVIRONMENT

PROCEDURE FOR CONDUCTING A SONAR SURVEY ON A HYDROCARBON STORAGE WELL

Procedure #: UICLPG-2a
(1/06)

Narrative:

K.A.R. 28-45-15 requires a sonar survey to determine the dimensions of a storage cavern at the following times:

- Before placing the storage cavern into service;
- Every 10 years
- Before plugging the storage well

A sonar survey may also be required for the following reasons:

- The cavern is used for brine generation
- The secretary deems it necessary to determine the capacity of the storage cavern
- The stability of the cavern is suspect
- After solutioning the cavern if a 20% or greater increase in volume occurs

A plan and schedule for conducting the sonar shall be submitted to the Kansas Department of Health and Environment (KDHE) for review and approval prior to conducting the sonar survey. The schedule shall be mutually agreed upon so KDHE may have the opportunity to witness the sonar survey.

Procedure:

1. Provide the name of the sonar company conducting the survey.
2. Provide a description of the sonar tool: capabilities and limitations. If the tool description has previously been filed with KDHE, this requirement may be omitted. The tool description must be submitted when a new sonar company, sonar tool or sonar process will be used.
3. List the well identification number and location of the well.
4. Specify if the sonar will or will not be conducted through the tubing. It is recommended when feasible the sonar be conducted with the tubing removed and the cavern brine filled for best results. Only a sonar tool approved by KDHE may be used for through the tubing sonars.
5. Provide a description of the well configuration.
6. Describe the action that will be taken if the sonar tool will not pass through the well and/or cavern.

7. Describe the contents of the cavern expected at the time of the proposed sonar survey. If a product/brine interface is anticipated, provide the estimated interface depth.
8. The sonar survey interpretation shall be submitted to KDHE with 30 days after survey completion. The sonar survey results shall be evaluated by a person with technical expertise in sonar interpretation.

The sonar interpretation summary shall include the following;

- A discussion of the dimensions and configuration of the cavern
- The relationship of the cavern to adjacent caverns
- A description and explanation of any anomalies
- A description of areas of the cavern hidden by fallen shale layers
- A description of any changes in operation necessary to obtain desirable cavern dimensions and configuration

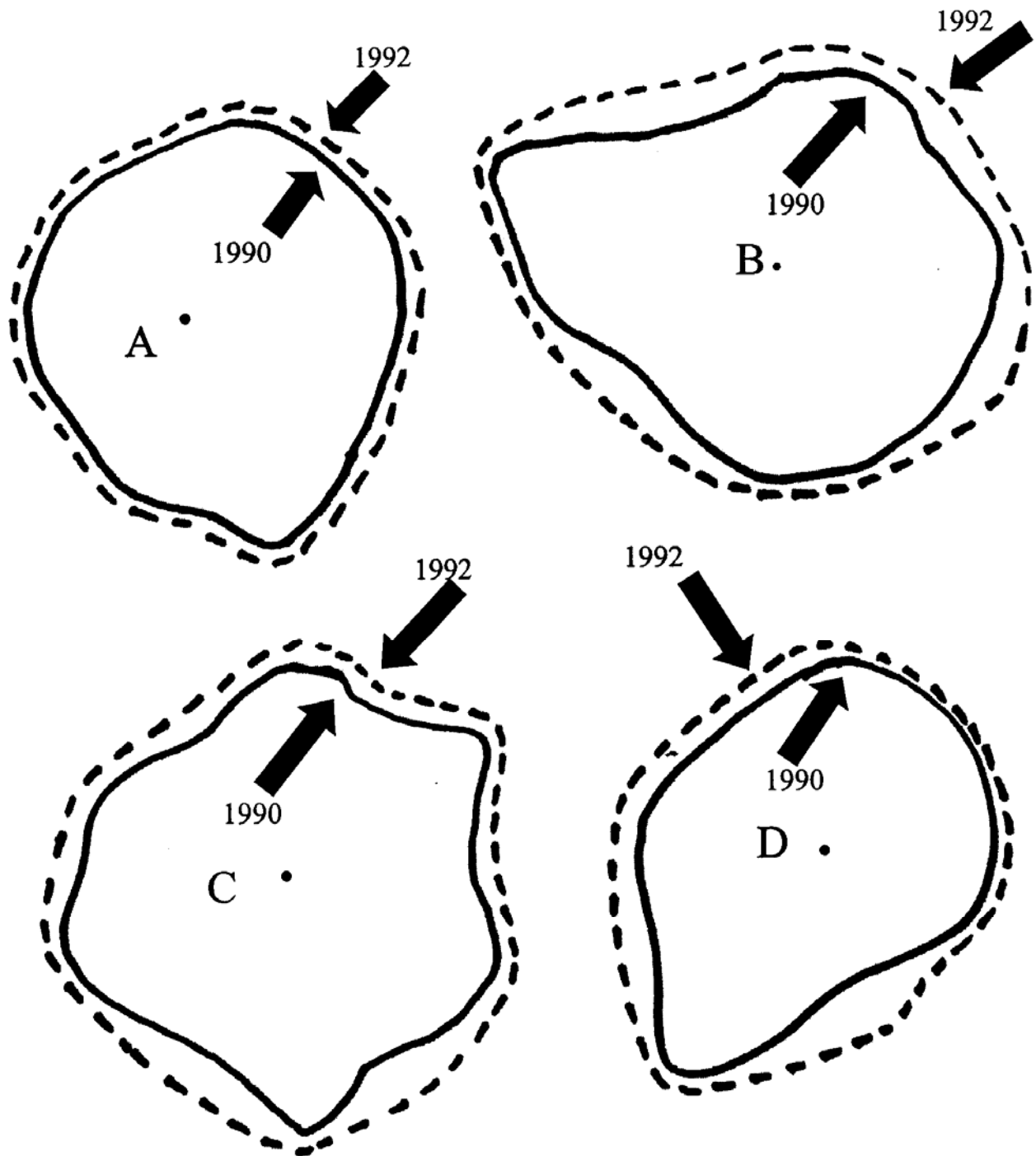
The sonar interpretation shall also include a diagram of the maximum cavern radii. Maximum cavern radii from previous sonar surveys shall be included on the diagram to illustrate cavern development with time. An example of a radii diagram is attached.

A cross-section of previous sonar survey results (if any) and an updated sonar plot map shall be submitted with the interpretation. The sonar plot map shall show the maximum radii for all hydrocarbon storage cavern locations in relation to surface structures, adjacent storage caverns, disposal wells, and public transportation arteries.

Attachments

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Procedure.UICLPG-2a
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Maximum Radii Plot Map



1" = 100'

Map should include all wells in field

CROSS SECTIONAL VIEW

DEPTH

WELL A

1991

1988

600'

700'

